METHOD AND APPARATUS FOR USER AUTHENTICATION USING RAMAN SPECTRUM

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from Korean Patent Application No. 10-2015-0143715, filed on Oct. 14, 2015, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] 1. Field
[0003] Methods and apparatuses consistent with exemplary embodiments relate to a method and an apparatus for user authentication, using a Raman spectrum.
[0004] 2. Description of Related Art
[0005] To protect the privacy of an individual user and personal information, biometric authentication technologies have been developed. For example, there are biometric authentication technologies using characteristic information of a unique body for each person such as fingerprint recognition, iris recognition, and the like.
[0006] In addition, with the development of portable devices and wearable devices, user personal authentication devices have been diversified, and user personal information that can be obtained from an optical characteristic may include information about the health status of a user, and therefore a healthcare system and user authentication technology are notable areas in the future.

SUMMARY

[0007] Exemplary embodiments may address at least the above problems and/or disadvantages and other disadvantages not described above. Also, the exemplary embodiments are not required to overcome the disadvantages described above, and may not overcome any of the problems described above.
[0008] Exemplary embodiments provide a method and an apparatus for user authentication, using a Raman spectrum.
[0009] According to an aspect of an exemplary embodiment, there is provided a user authentication apparatus using a Raman spectrum, the user authentication apparatus including a Raman spectrum analyzer configured to analyze user characteristic information from a Raman spectrum of a user. The user authentication apparatus further includes an authenticator configured to authenticate the user, based on the analysis.
[0010] The Raman spectrum analyzer may be further configured to extract, from the Raman spectrum, data including any one or any combination of a type of the Raman spectrum, a Raman shift of a peak point, and an intensity of the peak point, and analyze the extracted data as the user characteristic information.
[0011] The user authentication apparatus may further include a light source configured to irradiate skin of the user with light, and a Raman spectrum acquirer configured to receive light that is reflected from the skin, and acquire the Raman spectrum from the received light.
[0012] The light source may be further configured to irradiate the skin of the user with light for a predetermined time, and the Raman spectrum analyzer may be further

configured to, in response to fluorescence bleaching occurring in the Raman spectrum over time, extract a fluorescence bleaching range from the Raman spectrum, and analyze the extracted fluorescence bleaching range as the user characteristic information.
[0013] The Raman spectrum analyzer may be further configured to extract, from the extracted fluorescence bleaching range, data including either one or both of a principal component composition ratio of the skin of the user and feature information of a first principal component, and analyze the extracted data as the user characteristic information.
[0014] The Raman spectrum analyzer may be further configured to extract, from the extracted fluorescence bleaching range, the principal component composition ratio of the skin of the user, using a principal component analysis method.
[0015] The feature information of the first principal component may occupy a largest proportion of the principal component composition ratio.
[0016] The Raman spectrum analyzer may be further configured to repeatedly measure the feature information of the first principal component at an arbitrary time, and verify reproducibility of the measured feature information of the first principal component.
[0017] The user authentication apparatus may further include a storage configured to store the analysis as the user characteristic information, and the authenticator may be further configured to authenticate an identify of the user by comparing the analysis and pre-stored user characteristic information.
[0018] The user authentication apparatus may further include an information provider configured to process the analysis with respect to the authenticated user, and provide information of a health status of the authenticated user.
[0019] According to an aspect of another exemplary embodiment, there is provided a user authentication method using a Raman spectrum, the user authentication method including analyzing user characteristic information from a Raman spectrum of a user. The user authentication method further includes authenticating the user, based on the analysis.
[0020] The analyzing may include extracting, from the Raman spectrum, data including any one or any combination of a type of the Raman spectrum, a Raman shift of a peak point, and an intensity of the peak point, and analyzing the extracted data as the user characteristic information.
[0021] The user authentication method may further include irradiating light to skin of the user, receiving light that is reflected from the skin, and acquiring the Raman spectrum from the received light.
[0022] The irradiating may include irradiating light to the skin of the user for a predetermined time, and the analyzing may include, in response to fluorescence bleaching occurring in the Raman spectrum over time, extracting a fluorescence bleaching range from the Raman spectrum, and analyzing the extracted fluorescence bleaching range as the user characteristic information.
[0023] The analyzing may further include extracting, from the extracted fluorescence bleaching range, data including either one or both of a principal component composition ratio of the skin of the user and feature information of a first principal component, and analyzing the extracted data as the user characteristic information.